

WHAT IS CLAIMED IS:

1. A variable geometry cylinder mirror  
comprising:

a frame member;

5 a flexible thin film in which two end portions  
opposing each other are supported by said frame member;

a reflection surface which is provided on said  
flexible thin film and reflects light;

a first electrode provided integrally with said  
10 flexible thin film;

a second electrode substantially fixed to said  
frame member so as to oppose said first electrode on an  
opposite side of said reflection surface; and

a third electrode substantially fixed to said  
15 frame member so as to oppose said first electrode on  
the same side as said reflection surface,

wherein an optical opening to introduce light into  
said reflection surface is provided on the side of said  
reflection surface,

20 at least any one of said second and third  
electrodes is divided in the direction connecting said  
two end portions, and

the configuration of said reflection surface is  
controlled to a desired configuration by applying a  
25 desired voltage selectively to between said first  
electrode and said divided second or third electrode.

2. The variable geometry cylinder mirror

according to claim 1, wherein the reflection surface of said flexible thin film is formed of metallic thin film and serves as said first electrode.

3. The variable geometry cylinder mirror  
5 according to claim 1, wherein an openings are provided on both sides of said reflection surface in said flexible member across a straight line connecting the end portions supported by said frame member.

4. The variable geometry cylinder mirror  
10 according to claim 1, wherein in a region between the end portion supported by said frame member and said reflection surface in said flexible thin film, stiffness thereof in the direction in which said second or third electrode is divided is reduced.

15 5. The variable geometry cylinder mirror according to claim 4, wherein the region in which the stiffness of said flexible thin film is reduced is wave-like.

6. The variable geometry cylinder mirror  
20 according to claim 5, wherein said flexible thin film is composed of overlaid layers of metallic thin film and silicon nitride or metallic thin film and silicon oxide.

7. The variable geometry cylinder mirror  
25 according to claim 4, wherein as for the sectional area of said flexible thin film in a direction perpendicular to the direction in which said second or third

electrode is divided, that of the region in which the stiffness of said flexible thin film is reduced is smaller than that of a region corresponding to said reflection surface.

5           8. The variable geometry cylinder mirror according to claim 4, wherein an opening or a cutout is provided in the region in which the stiffness of said flexible thin film is reduced.

          9. The variable geometry cylinder mirror  
10 according to claim 1, wherein said flexible thin film is composed of overlaid layers of metallic thin film and polymer material thin film.

          10. The variable geometry cylinder mirror according to claim 7, wherein said flexible thin film  
15 is composed of overlaid layers of metallic thin film and polymer material thin film.

          11. The variable geometry cylinder mirror according to claim 8, wherein said flexible thin film is composed of overlaid layers of metallic thin film  
20 and polymer material thin film.

          12. The variable geometry cylinder mirror according to claim 1, wherein said third electrode and a supporting member thereof are provided outside said optical opening.

25           13. The variable geometry cylinder mirror according to claim 1, wherein said third electrode is disposed within said optical opening while said third

electrode disposed within said optical opening and the supporting member thereof have property allowing light to be transmitted through.

14. A variable geometry cylinder mirror  
5 comprising:

a frame member;

a flexible thin film in which two end portions  
opposing each other are supported by said frame member;

a reflection surface which is provided on said  
10 flexible thin film and reflects light;

a first electrode provided integrally with said  
flexible thin film; and

a second electrode substantially fixed to said  
frame member so as to oppose said first electrode on an  
15 opposite side of said reflection surface, the second  
electrode being divided in the direction connecting  
said two end portions,

wherein the configuration of said reflection is  
controlled to a desired configuration by applying a  
20 desired voltage selectively to between said first  
electrode and said divided second or third electrode.

15. The variable geometry cylinder mirror  
according to claim 14, wherein the reflection surface  
of said flexible thin film is formed of metallic thin  
25 film and serves as said first electrode.

16. The variable geometry cylinder mirror  
according to claim 14, wherein an openings are provided

on both sides of said reflection surface in said flexible member across a straight line connecting the end portions supported by said frame member.

17. The variable geometry cylinder mirror  
5 according to claim 14, wherein in a region between the end portion supported by said frame member and said reflection surface in said flexible thin film, stiffness thereof in the direction in which said second electrode is divided is reduced.

10 18. The variable geometry cylinder mirror according to claim 17, wherein the region in which the stiffness of said flexible thin film is reduced is wave-like.

19. The variable geometry cylinder mirror  
15 according to claim 18, wherein said flexible thin film is composed of overlaid layers of metallic thin film and silicon nitride or metallic thin film and silicon oxide.

20 20. The variable geometry cylinder mirror according to claim 17, wherein as for the sectional area of said flexible thin film in a direction perpendicular to the direction in which said second electrode is divided, that of the region in which the stiffness of said flexible thin film is reduced is  
25 smaller than that of a region corresponding to said reflection surface.

21. The variable geometry cylinder mirror

according to claim 17, wherein an opening or a cutout is provided in the region in which the stiffness of said flexible thin film is reduced.

22. The variable geometry cylinder mirror  
5 according to claim 14, wherein said flexible thin film is composed of overlaid layers of metallic thin film and polymer material thin film.

23. The variable geometry cylinder mirror  
according to claim 20, wherein said flexible thin film  
10 is composed of overlaid layers of metallic thin film and polymer material thin film.

24. The variable geometry cylinder mirror  
according to claim 21, wherein said flexible thin film  
is composed of overlaid layers of metallic thin film  
15 and polymer material thin film.

25. The variable geometry cylinder mirror  
according to claim 1, wherein said flexible thin film  
having said frame member, said reflection surface and  
said first electrode is manufactured by:

20 a diffused layer forming step of forming a diffused layer having a predetermined shape of a conductive type in a first main face of a mono-crystal silicon substrate of another conductive type;

a thin film laminating step of laminating a thin  
25 film on the first main face of the mono-crystal silicon substrate;

an etching step of, with a predetermined voltage

applied to the diffused layer of said conductive type,  
carrying out electrochemical etching from a second main  
face in an etching solution; and

5 a cutting and separating step of cutting and  
separating frame-like mono-crystal silicon which is  
part of said mono-crystal silicon substrate form  
portions corresponding to said flexible thin film and  
said frame member.

26. The variable geometry cylinder mirror  
10 according to claim 14, wherein said flexible thin film  
having said frame member, said reflection surface and  
said first electrode is manufactured by:

a diffused layer forming step of forming a  
diffused layer having a predetermined shape of a  
15 conductive type in a first main face of a mono-crystal  
silicon substrate of another conductive type;

a thin film laminating step of laminating a thin  
film on the first main face of the mono-crystal silicon  
substrate;

20 an etching step of, with a predetermined voltage  
applied to the diffused layer of said conductive type,  
carrying out electrochemical etching from a second main  
face in an etching solution; and

cutting and separating step of cutting and  
25 separating frame-like mono-crystal silicon which is  
part of said mono-crystal silicon substrate form  
portions corresponding to said flexible thin film and

said frame member.

27. The variable geometry cylinder mirror according to claim 5, wherein said flexible thin film having said frame member, said reflection surface and  
5 said first electrode is manufactured by:

a groove forming step of forming parallel grooves in a first main face of a flat substrate;

a thin film forming step of forming a thin film on the first main face of said substrate;

10 an etching step of etching until the thin film formed in said thin film forming step is exposed from a second main face of said substrate; and

a cutting and separating step of cutting and separating a frame-like portion which is part of said  
15 substrate from portions corresponding to said flexible thin film and said frame member.

28. The variable geometry cylinder mirror according to claim 18, wherein said flexible thin film having said frame member, said reflection surface and  
20 said first electrode is manufactured by:

a groove forming step of forming parallel grooves in a first main face of a flat substrate;

a thin film forming step of forming a thin film on the first main face of said substrate;

25 an etching step of etching until the thin film formed in said thin film forming step is exposed from a second main face of said substrate; and



a cutting and separating step of cutting and separating a frame-like portion which is part of said substrate from portions corresponding to said flexible thin film and said frame member.